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(57) Abstract

A beverage forming composition comprising ground tea or coffee which is capable of flowing and metering via a powder dispense valve within a vending machine, whereby, the addition of de-aerated water at a temperature of from 60° to 90°C to the composition produces a beverage within a container; the composition having a particle size selected such that the portion of ground components which float to the surface of the beverage is less than 1 % by weight of the total.

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NOVEL BEVERAGE FORMING COMPOSITION

The present invention relates to a novel beverage forming composition and has particular reference to novel beverage forming compositions for vending machines.

The traditional method of making beverages, such as tea or coffee is to infuse granules of coffee or leaf tea in hot or boiling water to obtain a beverage having the desired flavour. Traditionally such infusion is carried out in a teapot or a coffee pot and with suitable care excellent beverages can be prepared.

In domestic catering, this traditional method of preparing both tea and coffee is labour intensive and many attempts have been made to produce acceptable tea and coffee by automated machinery. One route has been to prepare freeze dried ingredients such for example as instant coffee and dried milk and to incorporate these in a vending machine in which an aliquot of one or more ingredients of which the beverage is to be

formed is dispensed into a cup and then adding to the powdered ingredients a quantity of pre-heated water. This system works generally well, but in many cases the quality of the beverage obtained in this way leaves much to be desired; at least some of the powdered ingredients float to the top and remain floating on the top, only succumbing finally to dissolution by fairly active stirring by the consumer, and, insofar as tea is concerned, freeze dried tea does not provide a beverage that bears any real resemblance to the taste of traditional leaf tea produced in a traditional manner. With the growth of automated vending machines for producing hot drinks such as tea, it has become desirable to attempt to produce automatically the quality of tea and coffee that can be produced manually. In machines presently available, fresh brewed tea can be prepared, but the machines available for this operation suffer from a number of disadvantages, namely:-

1. The brewing period necessary to produce an acceptable cup of tea or coffee is something of the order of 2 minutes.

2. This period can be shortened by forcing the infusion of tea or coffee into the water by exerting pressure, for example, by squeezing the ground tea or coffee. The resulting beverage tends to have a bitter taste because of the unnatural forcing of ingredients into the beverage which would not normally enter the beverage under a more natural brewing regime.

3. The operation involves the use of intermediate containers which act as the equivalent of coffee pots and tea pots within the vending machine. The pots require extensive and exhaustive cleaning on a regular basis to maintain hygiene.

4. Machines which utilize tea-bags containing leaf-tea overcome the disadvantages of having an intermediate brewing container since in such a machine, a tea-bag may be dispensed into a cup, and hot water added directly thereto in order to brew the tea in the container from which it is to be consumed. Furthermore, beverages produced from tea-bags do not suffer from floaters. However, the brewing period necessary to produce an acceptable cup of tea from tea-bags using water having a temperature of less than

100° celcius is of the order of two minutes or more, and tea made from tea-bags and boiling water, although brewing more-or-less instantly, tends to overbrew resulting in a bitter flavour.

In view of the foregoing it will be appreciated, therefore, that the automatic vending of brewed leaf tea or brewed ground coffee tends to lead either to a delay or to a bitter tasting produce, neither of which is acceptable in the vending art, and further requires the use of intermediate containers for the brewing process which leads to a major hygiene problem.

With tea in particular, it is well known that, on cooling from the brewing water temperature of approximately 90°C, damp tea leaves have a temperature in the range of from 20° to 55° celcius, which provides a fertile breeding ground at an ideal temperature for the breeding of micro organisms and, in particular, moulds and bacteria. In the event, therefore, that such damp tea leaves are left in the machine, rapid growth of micro organisms can occur thereby providing a source of contamination within the machine. Inadequate cleansing of the

infusion area of such a fresh brew machine has the result that grounds or other residuals are left in the area; under these conditions rapid bacterial growth can commence and, in consequence, beverages subsequently dispensed from the machine are contaminated. There is, therefore, in the vending industry and in the convenience food industry, a need for a leaf tea and a ground coffee beverage which has a significantly improved flavour over the flavour of presently brewed products available from vending machines, and is comparable with the flavour of beverages produced by the traditional method of producing beverages from leaf tea and ground coffee.

Many attempts have been made to satisfy this requirement by simply grinding tea and coffee to a fine powder and adding water. However, a significant proportion of such powdered ingredients tend to float to the top and remain floating on the liquid to some extent even in spite of considerable stirring by a consumer. It is necessary, in these circumstances, for the consumer to wait some considerable time for the solids content to "settle" at the bottom of the

cup or drinking container before the beverage is ready for consumption.

As a result of considerable research, the present applicants have prepared a beverage forming composition comprising ground components which, on adding water having a temperature of less than about 90° Celcius thereto in a container or cup, produces an "instant" beverage which has the flavour of fresh brewed leaf tea or coffee granules.

Furthermore, detailed investigations by the applicants have shown that the amount of floaters in any given beverage preparation involving ground components tends to be dependent on the amount of air or gas in the water dispensed to the ground ingredient. It is well known that air and carbon-dioxide are soluble in water and most water supplied in a domestic water main contains at least some air and carbon-dioxide dissolved therein. In the average vending machine, this water is introduced into a closed tank where it is then heated and the pressure in the tank therefore increases, that is to say that the tank is "self pressurised" and the water is maintained at an

elevated temperature which in general terms increases the solubility of the air in the water.

It follows, therefore, that if this surplus air, or at least a deleterious proportion of the surplus air can be removed from the water prior to dispensing, it will have a beneficial effect on drinks subsequently produced therefrom.

According to one aspect of the present invention, therefore, there is provided a water tank assembly for a vending machine which comprises a water reservoir; means partitioning said reservoir into a de-aerating portion and a water storage portion; heater means associated with the de-aerating portion; inlet means for the introduction of aerated water in juxtaposition with said de-aerating portion, and outlet means communicating with the storage portion for dispensing of de-aerated water to a beverage receptacle; wherein the water in the de-aerating portion is heated to a temperature sufficient to remove at least the deleterious portion of dissolved air or gas therein, the de-aerated water passing from the de-aerating portion to the storage portion where

it is maintained at a dispense temperature by heat emanating from the heater via the de-aerating portion of the resevoir.

The de-aerating portion of the reservoir may be defined by a substantially erect cylindrical partition with the main water reservoir, said cylindrical partition having a plurality of inlets or "castellations" at the base thereof to allow water within the resevoir to enter the de-aerating portion, and heater means being disposed within the cylinder towards to the base thereof, thereby to raise the temperature of water in juxtaposition thereto, to, at or towards its boiling point, thereby releasing and liberating dissolved gas which bubbles through the water to the surface and is dispersed therefrom. The cylindrical partition may be supported at its base by a plurality of circumferentially spaced legs; the spaces between each leg defining the inlets to permit water to enter the de-aerating portion. The top of the reservoir may be open to the atmosphere so that no pressure can build up therein. The upper portion of the cylinder may be open to communicate with the storage portion of the reservoir.

Inlet means may be provided in the reservoir to provide fresh aerated water at or towards the base of the cylindrical partition thereby allowing, on heating, the generation of a convection current whereby water is drawn into the cylinder for de-aeration prior to circulation to the storage portion. The storage portion of the reservoir may contain a thermostatic control connected with the heater, whereby the heater is operated to maintain the temperature of the water in the storage portion at an optimum temperature for dispense, namely within the range of from 60° to 90° Celcius.

According to one aspect of the present invention, water entry into the reservoir may be controlled by water-level sensing means. When the level of water in the reservoir falls below a predetermined low-water level, said sensing means operates the water inlet means to permit entry of fresh, aerated water into the reservoir. When the level of water in the reservoir reaches a predetermined high water-level, the sensing means operates the water inlet means to prevent further entry of water into the reservoir.

The sensing means may be an electromagnetic float switch consisting of a permanent magnet disposed on a float in the reservoir and a 2-state reed switch fixed in the water tank at either the high-water level or the low water level, whereby the influence of the permanent magnet on the reed sets the reed switch either to one state or to a second state, according to proximity of the permanent magnet to the switch.

Alternatively, the sensing means may comprise three water-level probes: one probe disposed at the high-water level; a second probe disposed at the low-water level; and a third probe as a reference. Each probe utilizes the conductivity of water at a sensing portion thereof to determine whether the sensing portion of the probe is immersed in water or otherwise.

According to another aspect of the present invention, the water level sensing means may comprise optically or capacitively coupled circuits to serve the level of water in the tank. In an alternative embodiment of the invention, the water-level sensing means may comprise a float having a stem which is arranged to

contact a microswitch disposed out of the water in the reservoir. The float either rises whereby the stem sets the microswitch to one state, or falls whereby the stem sets the microswitch to a second state.

In each case, water is permitted to enter the reservoir via the inlet means when the sensing means is in one state, and water is prevented from entering said reservoir when the sensing means is in the other or second state. Water entry into the reservoir of the water tank assembly may be controlled by a simple mechanical ballcock of the type well-known to a man skilled in the art.

In one embodiment of the present invention the upper extremity of the de-aerating portion may extend above the surface of the water in the reservoir by an amount such that, during heating, the water in the de-aerating portion 'boils over' into the surrounding reservoir, thus establishing a circulation within the reservoir as described above.

The storage portion of the reservoir is provided with an outlet which is adapted to draw water from a point in the storage portion spaced upwardly from the base thereof. In a preferred embodiment of the invention, the storage tank is provided with two outlets so that as water is dispensed into a receptacle the two jets from a pair of outlets which can produce a stirring action within the receptacle and aid mixing of the ingredients previously disposed therein.

In accordance with the invention, therefore, a ready heated supply of de-aerated water is available for the production of beverages.

Whilst any beverage will benefit from the use of de-aerated water prepared in the water-tank assembly described above, when a beverage is made from the beverage-forming composition as hereinafter described and de-aerated water, the proportion of ground components which float to the surface is less than 1% by weight of the total.

According to another aspect of the present invention, therefore, there is provided a beverage-forming composition comprising ground tea or coffee which is capable of flowing and metering via a powder dispense valve within a vending machine, whereby, the addition of de-aerated water at a temperature of from 60° to 90°c to the composition produces a beverage within a container; the composition having a particle size selected such that the portion of ground components which float to the surface of the beverage is less than 1% by weight of the total.

According to another aspect of the present invention, there is provided a beverage forming composition comprising a proportion of ground tea having a particle size such that at least 98% by weight is retained on a 38 micron mesh sieve and at least 50% by weight passes through a 125 micron mesh sieve, such that, on formation of a beverage with de-aerated water at a temperature of 60° - 90° celcius, less than 1% of the ground tea is retained on the surface of the beverage so formed.

According to another aspect of the present invention, there is provided a ground tea having a particle size such that, on successive sieving, 0.1 - 3% by weight is retained on a 250 micron mesh sieve, 28-48% by weight is retained on a 125 micron mesh sieve, 38-61% by weight is retained on a 63 micron mesh sieve, 1.8 - 15.3% by weight is retained on a 38 micron mesh sieve, and less than 0.4% by weight passes through said 38 micron mesh sieve.

The beverage forming composition may comprise a blend of ground tea, having the characteristics above, and a leaf tea having a particle size such that at least 10% by weight is retained on a 1 millimetre mesh sieve and at least 98% is retained on an 355 micron mesh sieve. In a preferred embodiment of the present invention the whole leaf tea is a Kenyan tea having good flow characteristics and a pour density of 0.35 - 0.45 grammes per mil and a settle density of 0.42 - 0.49 grammes per mil.

According to a further aspect of the present invention the leaf tea may have a particle size such that, on successive sieving, 0.05-0.25% by weight is retained

on a 2mm mesh sieve, 32-46% by weight is retained on a 1mm mesh sieve, 32-51% by weight is retained on a 600 micron mesh sieve, 13-21% by weight is retained on a 355 micron mesh sieve, 1.3 - 2.2% by weight is retained on a 250 micron mesh sieve and 0.5 - 1.5% by weight passes through said 250 micron mesh sieve.

The beverage forming composition, in accordance with the present invention, may further incorporate a proportion of surfactant with the tea sufficient to reduce the wetting angle on a tablet of tea by at least 5° and preferably by at least 8°. The surfactant selected is not critical and derivatives of stearic, linoleic and palmitic acids and natural wetting agents such as lecithin may be employed. Sorbitan mono stearate has been found to be particularly useful. The amount employed clearly depends on the nature of the surfactant, but it has been found that, for typical use in a vending machine, a proportion of surfactant in an amount of 0.3 - 1.5% by weight of the tea composition can employed.

The beverage forming composition of the present invention may further include a flowing agent to aid dispensing of the tea composition within a vending machine. This aids flow within a dispense valve and allows reasonably accurate metering of the tea during dispense on a timed basis. Thus it is possible within a vending machine to select a mild, medium or strong brew, depending purely on the period during which tea is dispensed into a container prior to mixing with the de-aerated water. Typical flow agents which can be used in this matter are those such as silicon dioxide such as that commercially available under the trade name Neosyl TS. The flowing agent may be present in an amount of from 0% to 1.5%, and preferably from 0.85% to 1.0% by weight.

In addition to the foregoing, colouring agents may be added to enhance the colour of the tea mix and the colour of the beverage. Colours which can be added are natural canthaxanthin, betacarotene and apocarotenal.

The beverage forming composition of the present invention may also include from 23% to 35% by weight, and preferably 30% by weight of a whitener, which is mixed intimately with the other components to assist with the infusion and formation of the beverage.

The whitener may be a non-diary creamer, dried milk powder, or milk. In a preferred embodiment of the present invention, the whitener consists of a semi-instant (agglomerated) non-diary creamer, dextrose monohydrate, lactose and glucidex (maltodextrin). This whitener mixes particularly well and may have a similar particle size to the ground tea.

According to one aspect of the present invention the non-diary creamer has a particle size such that, on successive sieving, 0.1 to 1% by weight is retained in a 500 micron mesh sieve, 20-23% by weight is retained on 250 micron mesh sieve, 41-45% by weight is retained on a 125 micron mesh, 29-35% by weight is retained on a 63 micron mesh, and 1.4 to 4.3% by weight passes through said 63 micron mesh. The agglomerated non-diary creamer may have a poured density in the

range of from 0.47 to 0.48g/ml, and a settled density in the range of from 0.55 to 0.58g/ml.

According to another aspect of the present invention, there is provided a method of preparing a beverage whereby de-aerated water, having a temperature in the range of from 60 ° - 90°c, is added to a beverage forming composition comprising ground tea or coffee in a container, wherein the beverage forming composition is capable of flowing and metering via a powder dispense valve within a vending machine, and has a particle size selected such that the portion of ground components which float to the surface of the beverage is less than 1% by weight of the total.

Clearly, a beverage can be made from the beverage-forming composition of the present invention using de-aerated water from any source, but a preferred source is a water tank as hereinbefore disclosed.

The present invention also includes a method of preparing a beverage by using the novel beverage forming compositions disclosed herein, in combination

with de-aerated water obtained using the water tank assembly of the invention, thereby obtaining beverages in which there are no floating components in the cup after dispensing, the solid components being retained in the base of the cup for disposal after consumption of the beverage. The solid components may form a sediment in the base of the cup which, in appearance, is not unlike tea leaves, as this is what it is, and does not produce an unacceptable "sludge" at the bottom of the cup. A further advantage is that beverages prepared using a beverage forming composition, in accordance with the present invention, can employ water at a temperature significantly below boiling, and is therefore more ready for "instant" consumption; such a beverage has a colour and flavour which develops sufficiently quickly to be defined as "instant".

The following is a description by way of example only and with reference to the accompanying drawings of methods of carrying the invention into effect.

In the accompanying drawings:

Figure 1 is a top view of a water tank of the present invention with the closure removed.

Figure 2 is a longitudinal section on line II-II through the water tank of Figure 1.

Figure 3 is a longitudinal section through line III - III of Figure 1.

Figure 4 is a side view of the water tank of Figure 1, partly cut away to show internal detail.

Figure 5 is a top view of a closure for the water tank of Figure 1.

Figure 6 is a bottom view of the closure of Figure 5.

Figure 7 is a side view of the closure of Figure 5, partly in cross-section through the line VII - VII of Figure 6.

Figure 8 is a longitudinal section through line VIII - VIII of Figure 7, with the closure fitted to the water tank of Figure 1.

Figure 9 shows the general assembly of a water tank in accordance with the present invention.

Referring to the drawings, a water tank 10 has a generally square base 12 which has a cut away at a corner 14 to provide an inwardly directed arcuate portion 15. Base 12 carrries an upstanding peripheral wall 11 which terminates at its upper end in a rim 16. The base 12 and wall 11 define an internal reservoir 13 in which, at cut-away corner 14, the wall 11 defines an arcuate wall portion 11' which terminates spaced downwardly from rim 16 in an outwardly directed step 44. Reservoir 13 carries at step 44 an upstanding generally turret-shaped compartment 17 which is defined by a curved turret-wall 19 extending upwardly from a generally circular turret-base 18, which meets wall 11' at step 44, and terminating in a rim 20, which is continuous with rim 16 of wall 11.

Turret base 18 is provided with a generally frustoconical overflow conduit 40, which extends upwardly through said turret base 18 of overflow turret 17 and terminates at an upper end 41 downwardly spaced from upper rim 16 of wall 11. The frustoconical internal surface of overflow conduit is continuous, but the portion of external surface 43 of overflow conduit 40, which is disposed below turret base 18, is wider than the portion of external surface 43 of overflow conduit 14, which extends into overflow turret 17.

Wall 11 of reservoir 13 carries towards a corner 21, adjacent turret compartment 17, a steam boss 22 having a generally circular cross-section; said steam boss 22 being disposed towards upper-rim 16 of wall 11 and having an internal conduit 23 of generally circular cross-section, which communicates with reservoir 13 for the purpose of venting said reservoir 13 to the atmosphere.

Base 12 has a circular hole at a part juxtaposed corner 14 and 21 of reservoir 13, and carries four upstanding legs 26, which are disposed around said

circular hole 24 and circumferentially equi-spaced around a circle slightly eccentric to hole 24. Each leg 26 has a generally rectangular cross-section and is provided with an inwardly-directed step 27, upwardly spaced from base 12. Each leg 26 carries at step 27 an upstanding cylindrical partition 28, which defines an internal de-aerating cylinder portion 37 and is supported in spaced relationship with base 12; the spacing being provided by the legs 26 serving to provide four inlets 30. Cylindrical portion 28 extends upwardly to terminate, downwardly spaced from the upper end 41 of overflow conduit 40, in rim 36 which is adapted in use to be disposed above the intended water level in the tank, indicated generally at 90.

Hole 24 in base 12 accommodates a heating element 25 which protrudes through hole 24 and extends upwardly into a lower portion of cylindrical partition 28.

Towards corner 21 of tank 10, on adjacent portions of wall 11, there are disposed two upstanding ribs 31. Each rib 31 extends upwardly from base 12 to just below upper rim 16 of wall 11; each rib 31 has a

generally triangular longitudinal section, a generally rectangular cross-section, and is contiguous with the internal surface of wall 11. Towards the lower end of each rib 31, there is provided a step 32 of square cross-section; step 32 is directed towards corner 21. Said ribs 31 support a trapezoidal partition plate 33, the narrower bottom end of which abuts each of the steps 32, said plate 33 extending upwardly to terminate just below the upper rim 16 of wall 11. Plate 33 thus partitions an inlet region 34 from the body of reservoir 13; which inlet region 34 communicates with the reservoir 13 via its open lower end 35.

The base 12 of water tank 10 is provided with two water outlet conduits 50. Each outlet conduit 50 extends upwardly through base 12 and terminates at an upper end 51 upwardly spaced from lower rim 29 of cylindrical partition 28. Each water outlet conduit 50 has a generally frustoconical internal surface 52, which is slightly downwardly tapered towards lower end 53. Each water outlet conduit 50 emerges from base 12 at lower end 53 in a water outlet boss 54.

Base 12 of water tank 10 is also provided with a generally cylindrical, depending drain boss which defines an internal drain conduit 56 of circular cross-section. Drain boss 57 at its upper end is flush with the internal surface of base 12, and terminates at its lower end in an annular rim 58.

The water tank 10 is further provided with a thermostat assembly 60 consisting of a thermostat 61 and a thermal trip 62. Thermostat assembly 60 is supported by three upwardly extending support posts 63. Each support post 63 is connected at its lower end to the base 12 and terminates at a height, intermediate the upper and lower ends of cylindrical partition 28, in an upper end 64. Each support post 63 has a generally rectangular cross-section and has a substantially vertical side wall 65. The three support posts 63 are arranged in a generally triangular configuration such that the vertical side walls 65 of each post 63 are disposed adjacent one to the others, thereby defining a vertical recess 66 which houses the thermostat assembly 60; the thermostat assembly 60 is a push fit into the recess 66.

Water tank 10 is adapted to be closed at its upper end by a closure 70. Closure 70 has a generally square crown 71 and a depending skirt 72 is disposed around the perimeter of the crown 71, defining an external, peripheral rim 73. Towards a corner 74 of closure 70 there is a depending frustoconical sleeve 75 which is downwardly tapered and terminates at its lower end in annulus 76. The sleeve 75 has a vertical slot 77 extending upwardly from annulus 76 to just below the underside of crown 71 of closure 70. The slot 77 is disposed towards the corner 74 of closure 70. Closure 70 is further provided with three probe conduits 80, which are disposed in crown 71 and arranged colinearly one with the others and adjacent the skirt 72 of closure 70. Closure 70 is further provided with a water inlet conduit 85 disposed in a corner adjacent corner 74 having sleeve 75.

Closure 70 carries, on the underside of crown 71, three substantially vertical, depending support posts 86. The posts 86 are circumferentially equally spaced around a circle having the same diameter as and concentric with, the cylindrical partition 28 of reservoir 13.

In order to fit the closure 70 to water tank 10, the closure 70 is aligned with the upper rim 16 of the tank 10 such that the sleeve 75 is coaxial with upper end 41 of overflow conduit 40. The closure 70 is then pushed onto upper rim 16 of tank 10 such that skirt 72 fits tightly inside rim 16 of wall 11, and rim 73 of closure 70 sits on the upper rim 16 of wall 11 of water tank 10; the frustoconical sleeve 75 surrounds the upper end 41 of overflow conduit 40, and the three support posts 86 are disposed around upper rim 36 of cylindrical partition 28. The inlet conduit 85 is disposed directly above the inlet region 34 of reservoir 13.

Each of the three probe conduits 18 houses a generally cylindrical probe grommet 84, having a cylindrical internal bore. A water level probe 81, 82, 83 passes through each probe grommet 84 and extends downwardly into reservoir 13.

The water level in the reservoir 13 is maintained by means of the water level probes 81, 82 and 83. When the water level reaches a predetermined low water level, the low water level probe 82 registers the low

level of water and activates an inlet valve thereby allowing water to enter the reservoir 13 of water tank 10. Water continues to enter the reservoir 13 until the high water level probe 81 registers the high level of water and the valve is closed, thereby stopping the entry of water. In operation, the high water level indicated generally at 90 is just below the upper end of cylindrical partition 28. A third water level probe 83 is used as a reference probe.

In use, fresh aerated water enters into the reservoir 13 of water tank 10 via inlet 85 of closure 70, inlet region 34 defined by partition plate 33, and under said plate 33 through open lower end 35. The water is metered into the tank by means of a separate supply or break tank as required by local water supply regulations.

The aerated water passes into the reservoir 13 through and via the inlets 30 into de-aerating cylinder portion 37. The thermostat 61 senses the low temperature of the incoming water and switches the heating element 25 to its operative state. The heating element 25 produces rapid heating of the water

within the cylindrical partition 28 to a temperature above that at which air is removed from the water. The temperature of the water increases to boiling which causes turbulence in the de-aerating portion 37. The boiling water boils over the upper rim 36 of the cylindrical partition 28 into the body of the reservoir 13 of the water tank 10 while de-aerated water moves from the body of the reservoir 13 of the tank 10 via the inlets 30 beneath the lower rim 29 of cylindrical partition 28 into the de-aerating portion 37. The process continues with the water circulating and being de-aerated by heating until thermostat 61 registers the predetermined temperature, thereby operating thermal trip 62 and switching off heater 25. In a steady state, the water in the reservoir 13 will slowly cool in which case the lower predetermined threshold thermostat 61 will sense the lower threshold temperature, and activate the heating elements 25 to produce heating and renewed deaeration as necessary, with water boiling over the top of cylindrical partition 28 into the body of the reservoir 13 of the tank 10 and water passing from this body of reservoir 13 into the lower portion of de-aerating portion 37, until the temperature of the water in the storage

portion reaches the temperature at which the thermostat 61 deactivates the heater 25.

In the event of a customer requiring a beverage, the solid ingredients for the beverage, such as leaf tea and creamer, will be dispensed into a receptacle such as a plastic cup; the receptacle will then be placed in a water dispense location for the vending machine. Activation of a water valve will release a predetermined amount of water into the cup via water outlet conduit 50, thereby producing a stirring and mixing action in the cup to produce the beverage. Water for tea is dispensed from one outlet 50 only to reduce turbulence and bubble formation. The vortex formed by one jet of water entering the cup at the edge mixes the tea beverage adequately. However, other beverages containing a greater volume of powder need better mixing. Therefore both dispenser outlets 50 are used for other drinks such as ground coffee mix.

In this way, de-aerated water can be supplied at predetermined temperatures for the formation of beverages.

The base 12 of water tank 10 is provided with drain conduit 56 for the purpose of draining down the tank completely for cleaning and maintenance purposes.

The following is an example of a beverage forming composition for use in a vending machine:-

Ground tea (100% Kenyan)	6.4 parts,
Whole leaf tea (100% Kenyan)	19.7 parts,
Dextrose monohydrate	15.4 parts,
Lactose	16.7 parts,
Glucidex 1T19	9.1 parts,
Neosyl TS	0.91 parts,
Sorbitan monostearate	0.69 parts,
Canthaxanthin (1% CWS)	0.36 parts,
Betacarotene (1% CWS)	0.27 parts,
Non diary creamer, semi-instant /semi-agglomerated	30.58 parts,

All the parts given are parts by weight.

The ground tea had a particle size such that, on successive sieving, 1.22% by weight was retained on a 250 micron mesh sieve, 47.40% by weight was retained

on a 125 micron mesh sieve, 50.41% by weight was retained on a 63 micron mesh sieve, and 0.95% by weight was retained on a 38 micron mesh sieve.

The whole leaf tea was produced by the method of cut, twist and curl (CTC), well known to a man skilled in the art, and had a particle size such that, on successive sieving, 0.06% by weight was retained on a 2mm mesh sieve, 22.74% by weight was retained on a 1mm mesh sieve, 52.86% by weight was retained on a 600 micron mesh sieve, 20.62% by weight was retained on a 355 micron mesh sieve, 2.21% by weight was retained on a 250 micron mesh sieve and 1.28% by weight passed through the 250 micron mesh sieve.

The beverage forming composition was prepared as follows:-

A quantity of tea was loaded into a grinder hopper and ground to produce the ground tea having the characteristics described above. A quantity of each of the sorbitan monostearate and the colouring agents was weighed out and the latter mixed with a portion of semi-agglomerated non-diary creamer.

In a blender, the remainder of the non-diary creamer was mixed for one minute with the lactose, colouring agents, sorbitan monostearate and Neosyl TS. The mixing was stopped and to the mixture was added the leaf tea, followed by the ground tea as prepared above.

After mixing in the blender for a further half minute, the Dextrose and Glucidex were added. The composition was then mixed again for a further half-minute and the resultant beverage forming composition removed from the blender.

A second beverage forming composition for use in a vending machine was produced, using the method as described above, and having the formulation given above. In this case, however, the ground tea used in the composition had a particle size such that, on successive sieving, 0.38% by weight was retained on a 250 micron mesh sieve, 29.94% by weight was retained on a 125 micron mesh sieve, 59.00% by weight was retained on a 63 micron mesh sieve, 10.43% was retained on a 38 micron mesh sieve, and 0.07% by weight passed through said 38 micron mesh sieve.

The whole leaf tea used had a particle size such that 14.95% by weight was retained on a 1.0mm mesh sieve, 62.65% by weight was retained on a 600 micron mesh sieve, 19.61% by weight was retained on a 355 micron mesh sieve, 2.03% by weight was retained on a 250 micron mesh sieve, and 0.74% by weight passed through said 250 micron mesh sieve.

On addition of de-aerated water having a temperature of 60° - 90°c from a water tank assembly, as described herein to a sample of the beverage forming composition in a receptacle, it was found that, in each case, the beverage forming composition wetted, dispersed, sank and brewed. The tea leaves fell to the bottom of the receptacle and did not float to the surface even when most of the beverage had been consumed. The residual brewed leaf tea can then thrown away with the receptacle thus preventing a mess, and removing the cause of bacterial growth and mould, within a vending machine.

The beverage forming composition described above will wet, disperse, sink and brew in circumstances with, for example, water heated to a temperature of from

60°c - 90°c in a kettle, although it is preferred to use de-aerated water obtained using the water and tank assembly substantially as described herein.

CLAIMS

1. A beverage forming composition comprising ground tea or coffee which is capable of flowing and metering via a powder dispense valve within a vending machine, whereby, the addition of de-aerated water at a temperature of from 60° to 90° celcius to the composition produces a beverage within a container; the composition having a particle size selected such that the portion of ground components which float to the surface of the beverage is less than 1% by weight of the total.

2. A beverage forming composition as claimed in claim 1, comprising ground tea having a particle size such that at least 98% by weight is retained on a 38 micron mesh sieve and at least 50% by weight passes through a 125 micron mesh sieve, such that, on formation of a beverage with de-aerated water at a temperature 60° - 90° celcius, less than 1% of the ground tea is retained on the surface of the beverage so formed.

3. A beverage forming composition as claimed in claim 1 or claim 2, wherein the ground tea has a particle size such that on successive sieving, 0.1 - 3% by weight is retained on a 250 micron mesh sieve, 28-48% by weight is retained on a 125 micron mesh sieve, 38-61% by weight is retained on a 63 micron mesh sieve, 1.8 - 15.3% by weight is retained on a 38 micron mesh sieve, and less than 0.4% by weight passes through said 38 micron mesh sieve.

4. A beverage forming composition as claimed in any preceding claim wherein the composition comprises a leaf-tea having a particle size such that at least 10% by weight is retained on a 1 millimeter mesh sieve and at least 98% by weight is retained on a 355 micron mesh sieve.

5. A beverage forming composition as claimed in claim 4 wherein the leaf tea has a particle size such that, on successive sieving, 0.05-0.25% by weight is retained on a 2mm mesh sieve, 32-46% by weight is retained on a 1mm mesh sieve, 32-51% by weight is retained on a 600 micron mesh sieve, 13-21% by weight is retained on a 355 micron mesh sieve, 1.3 - 2.2%

by weight is retained on a 250 micron mesh sieve and 0.5 - 1.5% by weight passes through said 250 micron mesh sieve.

6. A beverage forming composition as claimed in claim 4 or claim 5 wherein the leaf-tea is a Kenyan tea having good flow characteristics and a pour density of 0.35 - 0.45 grammes per mil and a settle density of 0.42 - 0.49 grammes per mil.

7. A beverage forming composition as claimed in any preceding claim wherein said composition incorporates a proportion of a surfactant selected from the group consisting of sorbitan monostearate and the derivatives of stearic, linoleic and palmitic acids.

8. A beverage forming composition as claimed in any preceding claim wherein the composition includes from 0% to 1.5% by weight of a silicon dioxide flowing agent.

9. A beverage forming composition as claimed in any preceding claim wherein the composition further includes a colouring agent selected from the group

consisting of canthaxanthin, betacarotene and apocarotenal.

10. A beverage forming composition as claimed in any preceding claim wherein said composition comprises a whitener selected from the group consisting of a non-diary creamer, dried milk powder and milk.

11. A method of preparing a beverage whereby de-aerated water, having a temperature in the range of from 60° - 90° celcius, is added to a beverage forming composition comprising ground tea or coffee in a container, wherein the beverage forming composition is capable of flowing and metering via a powder dispense valve within a vending machine, and has a particle size selected such that the portion of ground components which float to the surface of the beverage is less than 1% by weight of the total.

12. A method of preparing a beverage as claimed in claim 11 wherein the de-aerated water is produced by a water tank assembly substantially as hereinbefore described.

FIG. 1.

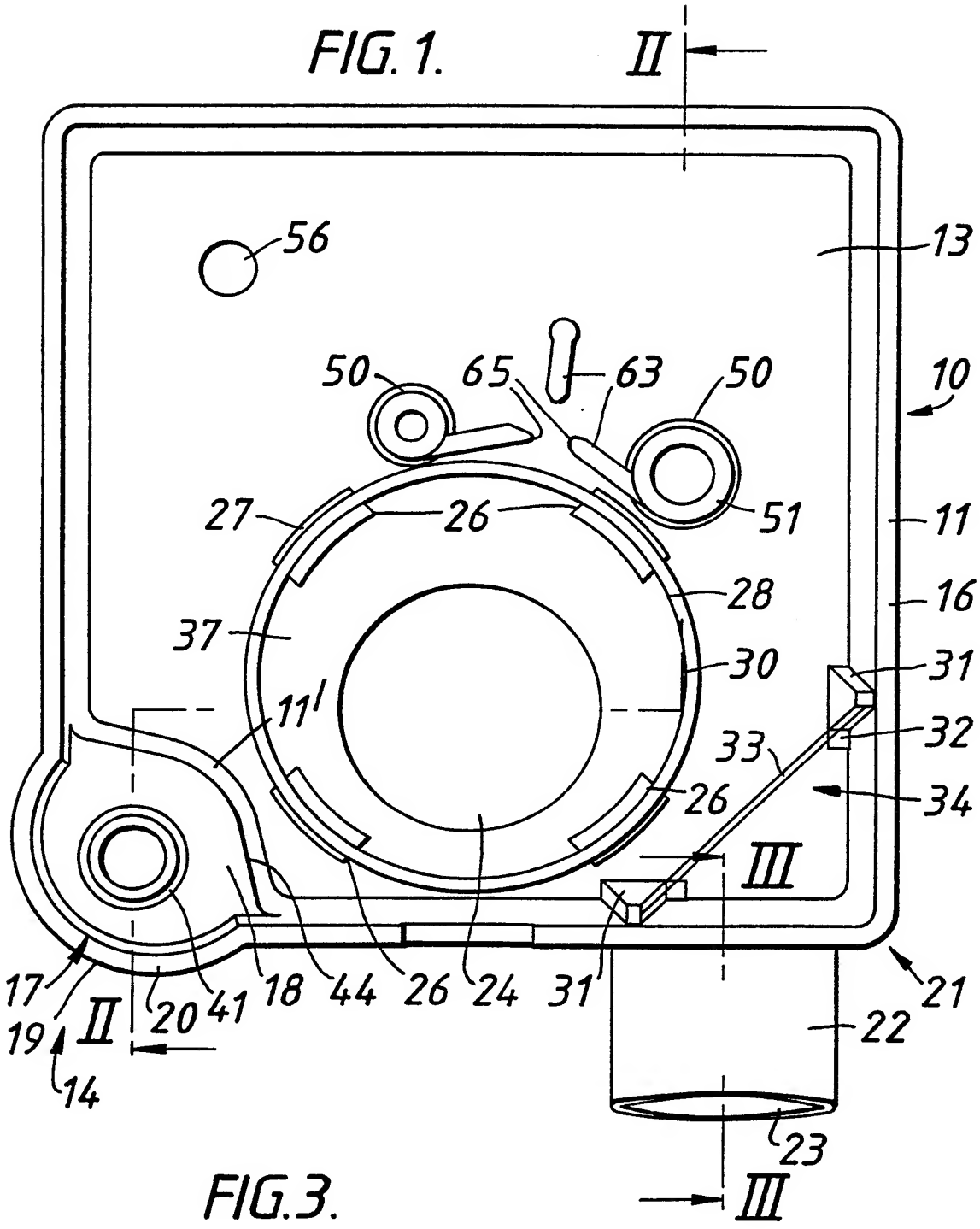
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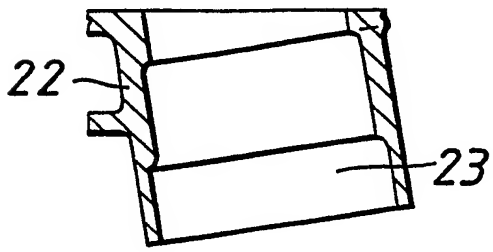
FIG. 3.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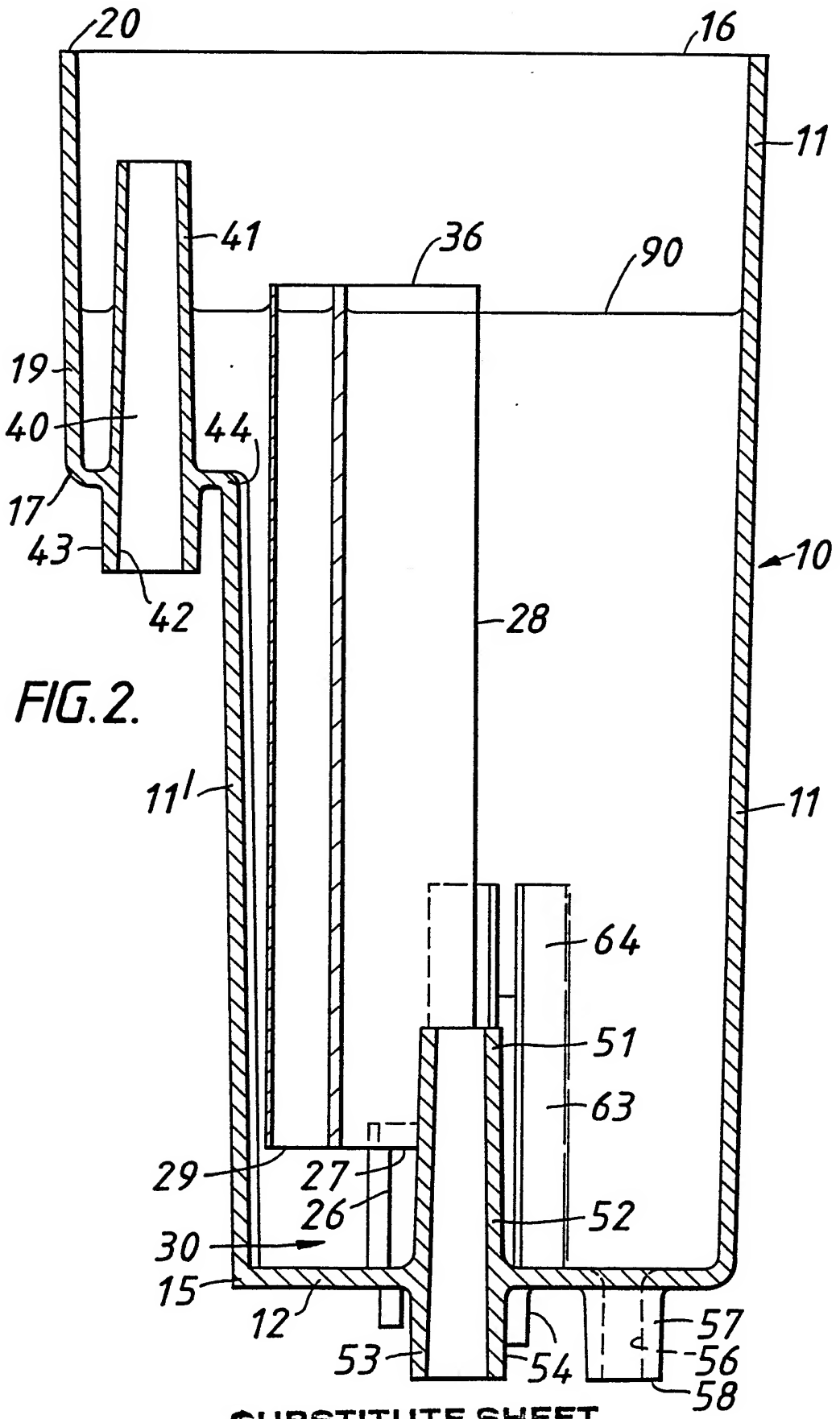
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FIG. 2.

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FIG. 4.

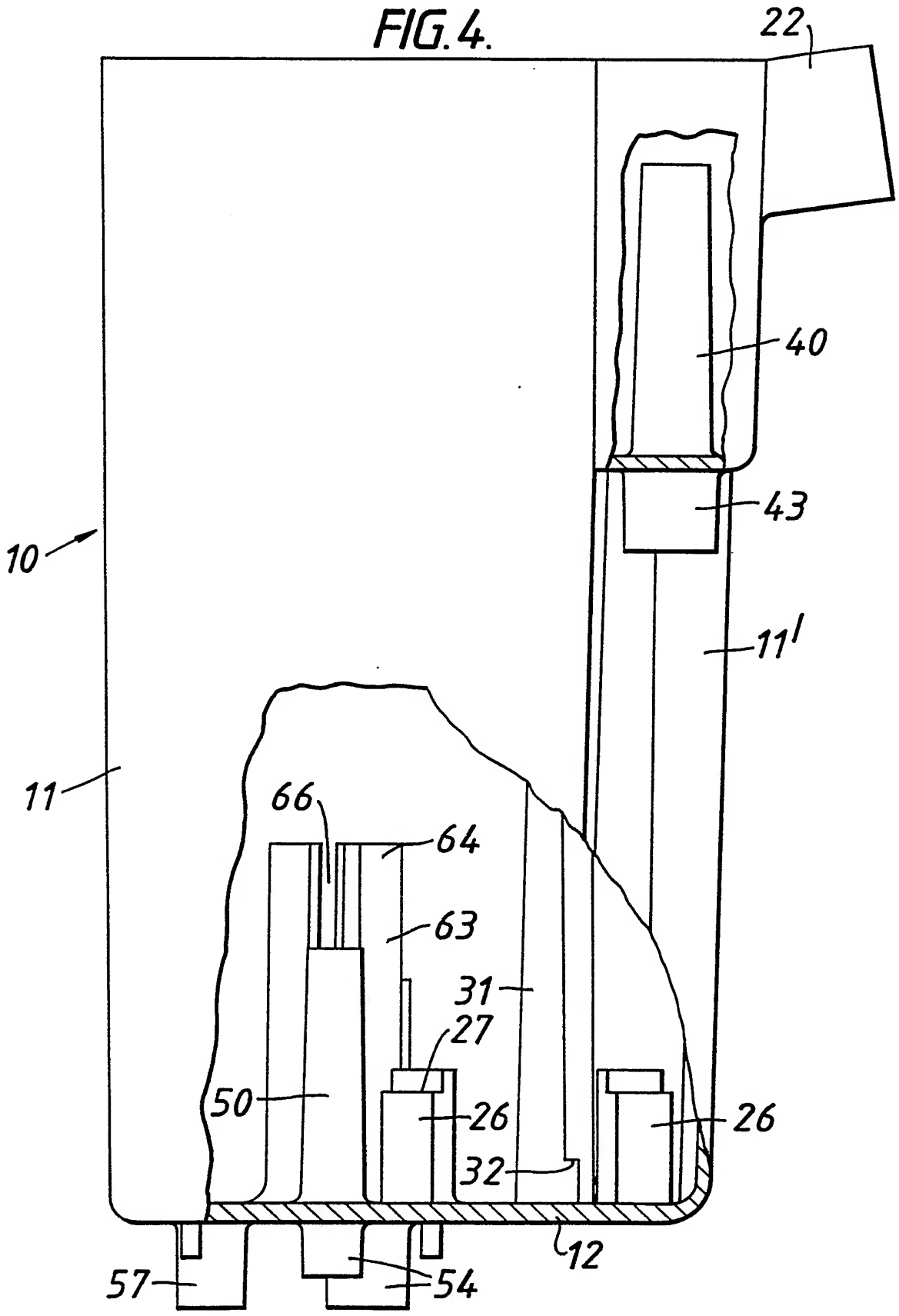

FIG. 5.

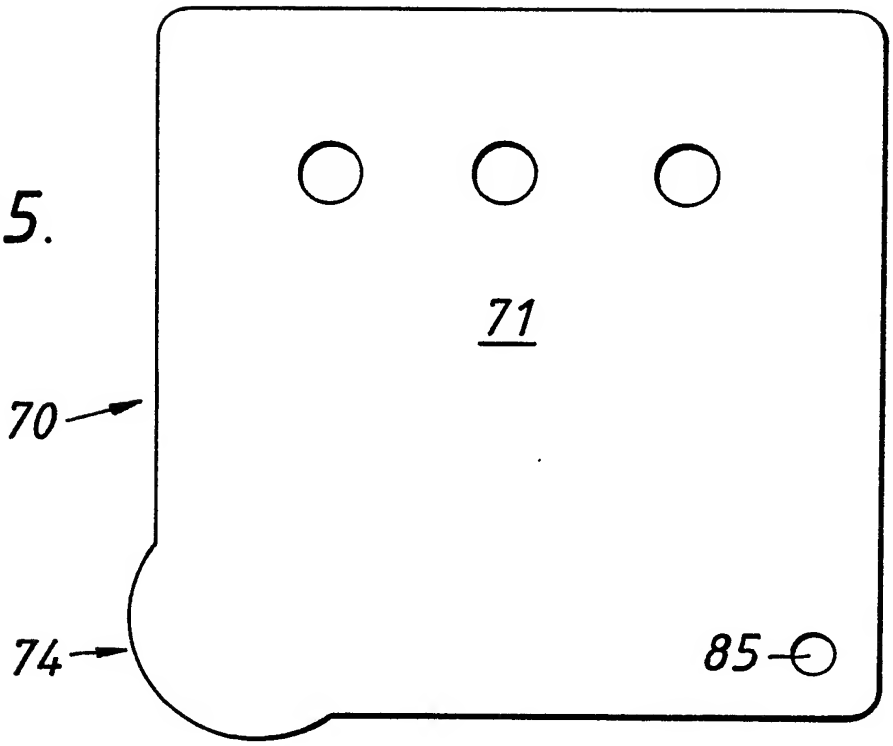

FIG. 6.

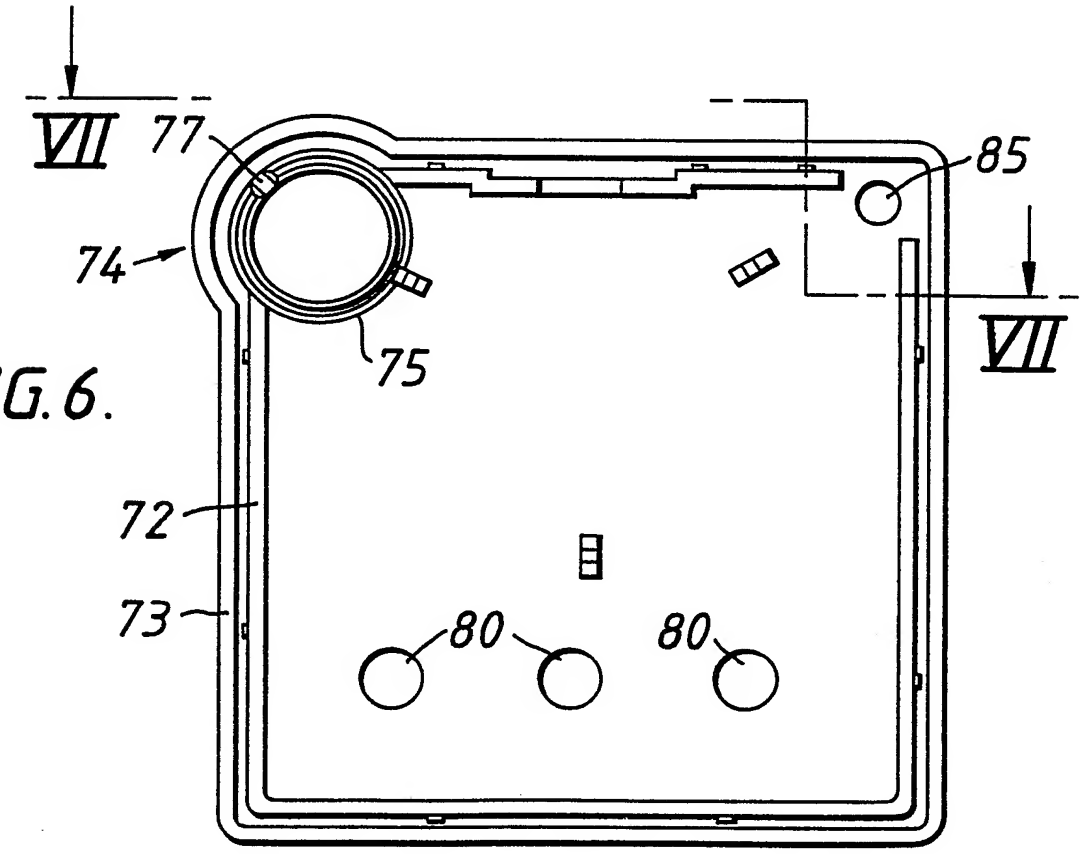

FIG. 7.

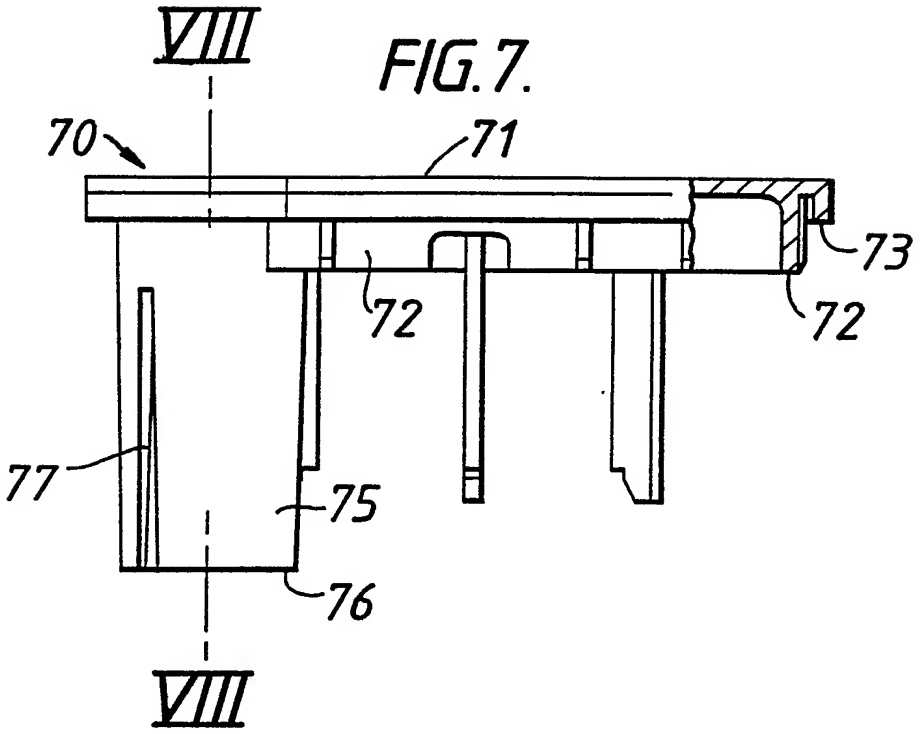

FIG. 8.

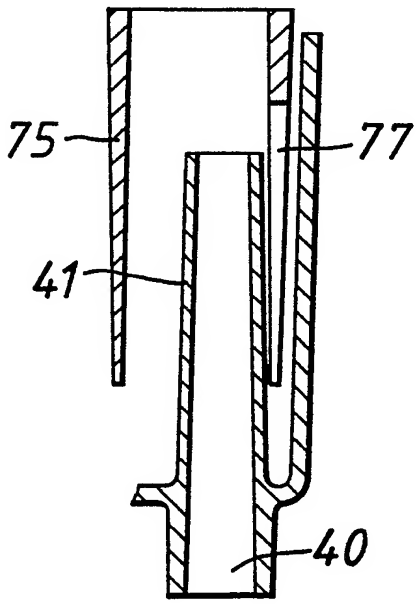

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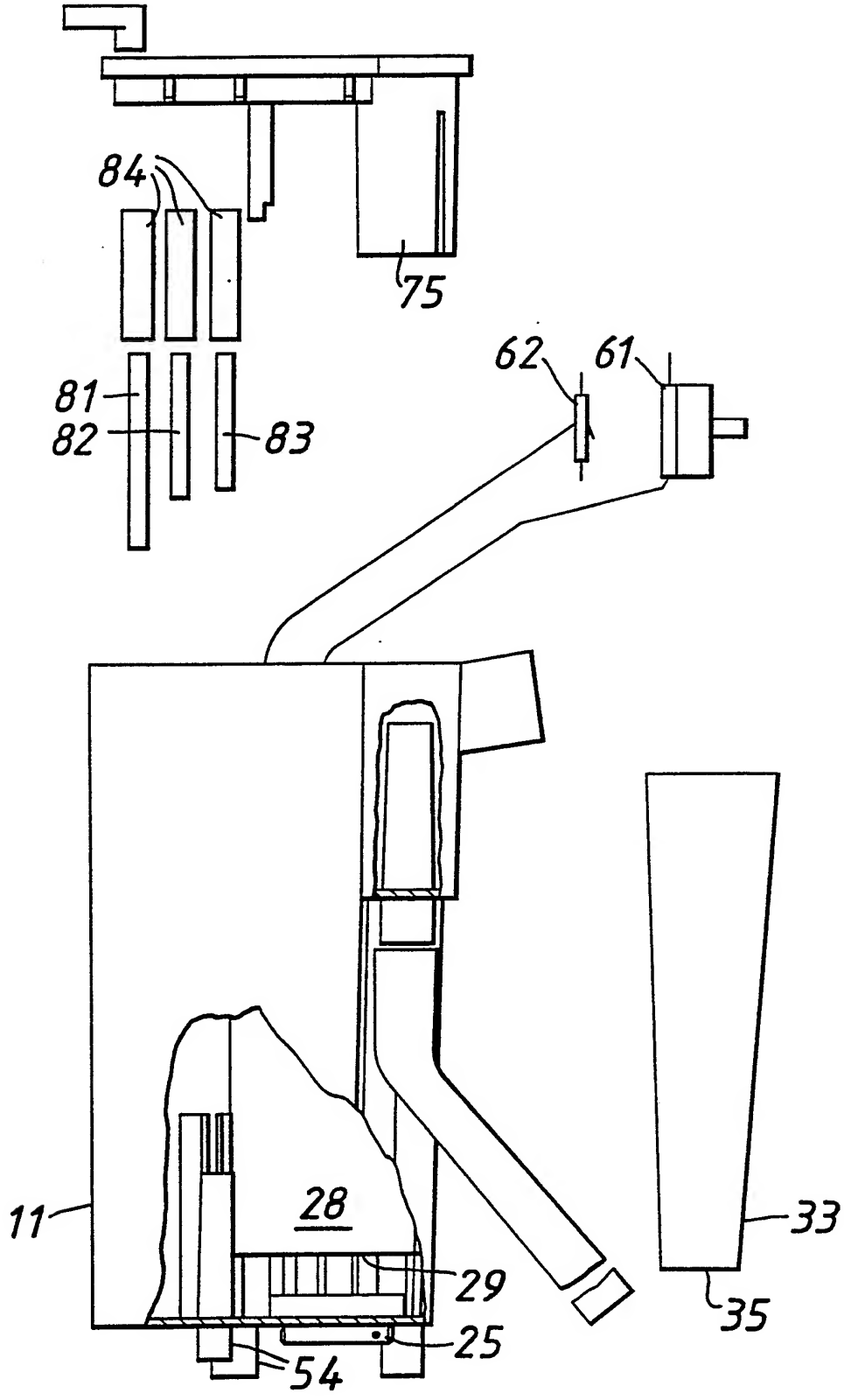
FIG. 9.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 90/00911

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: A 23 F 3/14, A 23 F 3/18, A 23 F 5/10

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	A 23 F

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	Derwent File Supplier WPIL, 1984, An. 84. 282182 (45), Derwent Publications Ltd, (London, GB), & ZA, A, 8308419 (VEL INDUSTRIES LTD) 23 May 1984 see abstract	1,2,11
Y	US, A, 2235700 (F.R. ELDRED) 18 March 1941 see claim 1; page 2, lines 28-32	1,2,11
A	GB, A, 1117103 (NESTLE'S) 12 June 1968 see claim 1; page 2, lines 28-44; example 2	4,5

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* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
25th September 1990	30. 10. 90
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	Mme N. KUIPER

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages	Relevant to Claim No.
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A	GB, A, 2027662 (C.P. WIELAND) 27 February 1980 see claims 1-3; page 1, lines 68-96	8
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A	GB, A, 13690 (G.H. RANGELEY)(A.D.1909) 9 June 1910 see claims 1,2; page 2, lines 4-10	10
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A	Patent Abstracts of Japan, vol. 12, no. 338 (C-527)(3185), 12 September 1988, & JP, A, 6398353 (LION CORP.) 28 April 1988 see abstract	9
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A	Patent Abstract of Japan, vol. 7, no. 61 (C-156)(1206), 15 March 1983, & JP, A, 57208948 (KARUPISU SHOKUHIN KOGYO K.K.) 22 December 1982 see abstract	7

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 9000911

SA 37692

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 18/10/90
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		SE-A- 7611795	25-04-77
		US-A- 4076847	28-02-78
GB-A- 2027662	27-02-80	None	
GB-A- 13690		None	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82